DAVID S. NOLAN

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Education:

Harvard University, Graduate School of Arts and Sciences, Cambridge, Massachusetts.
Ph.D. in Earth and Planetary Sciences, completed October, 1996.
Advisor: Brian Farrell.
Thesis: *Axisymmetric and Asymmetric Vortex Dynamics in Convergent Flows.*

Harvard College, Cambridge, Massachusetts.
B.A., Physics, *cum laude* 1990.

Research and Teaching Experience:

7/01 - Present: *Visiting Research Scientist, Princeton University Program in Atmospheric and Oceanic Sciences and Geophysical Fluid Dynamics Laboratory.* Development and testing of the Weather Research and Forecast model (WRF) for idealized and real-case simulations of tropical cyclones; ongoing theoretical studies of the inner-core dynamics of hurricanes and tornadoes.

11/98 - 6/01: *Postdoctoral Fellow, Department of Atmospheric Science, Colorado State University.* Research on the inner-core dynamics of tropical cyclones, the application of adaptive mesh refinement and three-dimensional vortex methods to the study of intense atmospheric vortices, and the dynamics of swirling boundary layers.

11/96 - 11/98: *Visiting Postdoctoral Fellow, Mathematics Department, Computing Sciences Directorate, Lawrence Berkeley National Laboratory.* Research in numerical simulations of tornado-like vortices, mathematical analyses of turbulent swirling boundary layers, the stability and dynamics of vortices maintained by radial inflow, the dynamics of such vortices under stochastic forcing, and the application of three-dimensional vortex methods to the study of intense atmospheric vortices and turbulence.

1990-1996: *Research Assistant, Department of Earth and Planetary Sciences, Harvard University.* Studied the formation and intensification of tornadoes, hurricanes, and other atmospheric vortices; developed numerical model of axisymmetric incompressible flow; extended recent work on the generalized stability and stochastic forcing of atmospheric flows to two-dimensional vortex dynamics.

1990-1995: *Teaching Fellow, Harvard University.* Developed and graded assignments and tests, ran weekly sections for the following courses:
Earth and Planetary Sciences 5, "Introduction to Environmental Sciences: Atmosphere, Ocean, and Biosphere," 1994 and 1995 (Head TF in 1995).
Earth and Planetary Sciences 234, "Dynamic Meteorology," 1992-1994.
Earth and Planetary Sciences 100a, "Introduction to Meteorology," 1992-1995.
Science A-30, "The Atmosphere," 1991.
Earth and Planetary Sciences 107, "Environmental Geoscience A: Ocean-Atmosphere-Crust Geochemical Interactions," 1990.

1992, Summer: *Research Assistant, Department of Mathematics, Lawrence Berkeley National Laboratory.* Studied recent advances in computational fluid dynamics and investigated their application to atmospheric vortices and other meteorology problems; assisted in writing computer programs for flow visualization.

1989, Summer: *Research Assistant, Department of Physics, Smith College,* Northampton, MA. Ran experiments using laser scattering to measure miscible/immiscible liquid phase changes as a function of temperature; helped develop new experimental method to measure angular distribution of laser scattering; wrote computer programs to measure data and drive experiments.

Memberships:

1997-Present: *American Meteorological Society.*

2000-Present: *American Geophysical Union.*

Publications:

Nolan, David S., 1996: *Axisymmetric and Asymmetric Vortex Dynamics in Convergent Flows.* Ph.D. Thesis, Department of Earth and Planetary Sciences, Harvard University.

Nolan, David S., and Brian F. Farrell, 1999: Generalized stability analyses of asymmetric disturbances in one- and two-celled vortices maintained by radial inflow. *J. Atmos. Sci.,* **56**, 1282-1307.

Nolan, David S., and Brian F. Farrell, 1999: The structure and dynamics of tornado-like vortices. *J. Atmos. Sci.*, **56**, 2908-2936.

Nolan, David S., and Brian F. Farrell, 1999: The intensification of two-dimensional swirling flows by stochastic asymmetric forcing. *J. Atmos. Sci.*, **56**, 3937-3962.

Nolan, David S., and Michael T. Montgomery, 2000: The algebraic growth of wavenumber one disturbances in hurricane-like vortices. *J. Atmos. Sci.*, **57**, 3514-3538.

Nolan, David S., Ann S. Almgren, John B. Bell, 2000: Studies of the relationship between environmental forcing and the structure and dynamics of tornado-like vortices. *Lawrence Berkeley National Laboratory Reoprt no. LBNL-47554*.

Nolan, David S, 2001: The stabilizing effects of axial stretching on turbulent vortex dynamics. *Phys. Fluids*., **13**, 1724-1738.

Nolan, David S., Michael T. Montgomery, and Lewis D. Grasso, 2001: The wavenumber one instability and trochoidal motion of hurricane-like vortices. To appear in *Journal of the Atmospheric Sciences.*

Nolan, David S., and Michael T. Montgomery, 2001: The dynamics of nonhydrostatic, three-dimensional perturbations to three-dimensional, balanced, hurricane-like vortices. Part I: Formulation, linearized evolution, and stability. Submitted to *Journal of the Atmospheric Sciences.*

Conferences - Accepted Abstracts:

Nolan, David S., and Brian F. Farrell, 1998: The intensification of two-dimensional swirling flows by stochastic asymmetric forcing. Presented at the Rossby-100 Symposium, June 1998, Stockholm, Sweden.

Nolan, David S., and Brian F. Farrell, 1998: The Reynolds number dependence of the flow structure and maximum windspeeds in tornado-like vortices. Presented at the 19th Conference on Severe Local Storms, September, 1998, Minneapolis, MN.

Nolan, David S., 1999: Vortex stabilization in deformation fields. Presented at the 12th Conference on Atmospheric and Oceanic Fluid Dynamics, June, 1999, New York City, NY.

Nolan, David S., and Michael T. Montgomery, 1999: The role of vortex-Rossby waves in the algebraic growth of wavenumber one disturbances in hurricane-like vortices. Presented at the 12th Conference on Atmospheric and Oceanic Fluid Dynamics, June, 1999, New York City, NY.

Nolan, David S., Ann. S. Almgren, and John B. Bell, 2000: Axisymmetric modeling of tornado-like vortices with adaptive mesh refinement. Presented at the Symposium on the Mystery of Severe Storms: A Tribute to the Work of T. Theodore Fujita, January, 2000, Long Beach, CA.

Nolan, David S., Michael T. Montgomery, and Paul D. Reasor, 2000: Studies of the wavenumber one instability in hurricane-like vortices. Presented at the 24th Conference on Hurricanes and Tropical Meteorology, Fort Lauderdale, FL, May, 2000.

Nolan, David S., and Michael T. Montgomery, 2000: Three-dimensional asymmetric eigenmodes of balanced, hurricane-like vortices. Presented at the 24th Conference on Hurricanes and Tropical Meteorology, Fort Lauderdale, FL, May, 2000.

Abstracts for the papers listed above (including the Ph.D. thesis) can be viewed at http://www.gfdl.noaa.gov/~dsn. Postscript versions of the submitted papers can also be downloaded from this site.